

Chemistry 12 Textbook Review: p.218-221; p.281-283; p.286-290.

Solutions for textbook review questions are available on-line.

Part I

1. A chemist is using electromagnetic radiation with a frequency of $6.0 \times 10^{12} \text{ s}^{-1}$ to excite an atom.
 - a) What is the wavelength of the radiation?
 - b) Calculate the energy (in kJ) for this radiation.
2. A radiowave has a wavelength of 5.0 m.
 - a) What is the frequency of the radiation?
 - b) Calculate its energy (in kJ/mol).
3. Calculate the energy released when an electron in a hydrogen atom moves from:
 - a) $n=3$ to $n=1$
 - b) $n=4$ to $n=2$
4. Calculate the wavelength of electromagnetic radiation released in 3 a).
5. Write the electron configuration of:
 - a) Sr b) Ta c) Gd d) Br e) Cl^- f) Mg^{2+}
6. Write the short-form electron configuration for 5 a) and b).
7. Draw the energy level diagram for 5a).
8. How many valence electrons are there in: a) Si b) P
9. State the 4 quantum numbers for:
 - a) a 2s electron b) a $3p_z$ electron c) a $4d_{xz}$ electron d) two electrons in $4p_y$
10.
 - a) Compare the relative size of the 1st ionization energies of Li and Be.
 - b) Compare the relative size of the 2nd ionization energies of Li and Be.
 - c) Compare the relative size of the 1st ionization energies of Mg and Al.

Part II

1. Using valence bond theory, explain why aluminum forms three sigma bonds instead of one.
2. Draw the Lewis structure and Electron dot structures for each:
 - a) BCl_3 b) N_2O_2 c) CN^-
3. Draw the structural formula and the orbital representation of:
 - a) LiH b) BeCl_2 c) SiH_4

4. Name the shape, draw the shape and state the bond angle(s) for each of the following:

- a) CaCl_2 b) NH_3 c) SF_6 d) PCl_5 e) CHBr_3

5. Identify the type of bond forms between:

- a) $\text{N} - \text{S}$ b) $\text{Si} - \text{I}$ c) $\text{N} - \text{Br}$ d) $\text{K} - \text{F}$

6. Rank these bonds from least to most polar:

- a) $\text{H} - \text{I}$ b) $\text{P} - \text{I}$ c) $\text{Si} - \text{F}$ d) $\text{Mg} - \text{N}$ e) $\text{F} - \text{F}$

7. Draw all the possible structural isomers of $\text{C}_2\text{H}_2\text{Br}_2$ and which isomers have a molecular dipole (consider bond dipoles, VSEPR-predicted shape and the net molecular dipole).

8. What shape is likely to be found around each atom in N_2F_2 ?

9. Which of the following has molecular dipole?

- a) LiCl b) BeF_2 c) BI_3 d) CaCl_2 e) NH_3 f) SF_6

10. Complete the following table:

Solid	Example	Force(s) of Attraction in Solid	Relative Melting Point	Hardness	Electrical Conductivity:	
					As a Solid	As a Liquid
Atomic						
Molecular (non-polar)						
Molecular (polar)						
Metallic						
Ionic						
Network						

11. Compare and explain the different properties of graphite and diamond.

12. a) Based only on the concept of van der Waals (i.e. London) forces only, would you expect KBr or BeO to have a higher melting point? Explain.

b) The actual melting points are: KBr mp = 734°C ; BeO mp = 2530°C . Do these observations agree with part a)? Why or why not.